

REMARKS

This Amendment is in response to the Office Action dated March 2, 2011 (the Action). Claims 1-19 were pending at the time of the Action, and Claims 20-21 are canceled. Claims 1-7 and 15-19 are withdrawn from consideration due to a restriction requirement. Claims 8, 9, 10 and 13 stand rejected under 35 U.S.C. § 102(a) as being anticipated by International Application No. WO 2004/004420 to Uchida (Uchida). Claims 11 and 12 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 3,244,495 to Apple (Apple) in view of Uchida. Claim 14 stands rejected under 35 U.S.C. § 103(a) as being unpatentable over Uchida in view of U.S. Patent No. 5,349,167 to Simcock (Simcock). It is noted that the citations to Uchida below are made with respect to its U.S. equivalent, U.S. Patent No. 7,202,451, to be consistent with the citations in the Action.

Claims 22-23 are new and depend from Claim 8. Support for Claims 22-23 may be found, for example, in Figure 3 and the Abstract of the Application as filed.

-Applicants respectfully request reconsideration for the reasons discussed below.

I. Claims 8-14 are Patentable over Uchida, Apple and Simcock

Claim 8 recites as follows:

8. An apparatus for melting glass via induction melting comprising:
 - a current conducting melting vessel;
 - at least two induction heating coils provided at selected locations proximate to the melting vessel;
 - a plurality of power supply circuits each being associated with a respective one of the heating coils and being arranged for selectively supplying power to a respective coil to thereby energise that respective coil; wherein
 - each power supply circuit includes a switching element arranged to prevent or permit a mutual induction of current in a respective heating coil when an adjacent heating coil is energised according to a selected on or off status of the switching element.

An apparatus according to some embodiments of present invention may include a first heating coil with an associated electrical circuit, such as the circuit shown in Figure 3 of the application. Alternating current may be used to heat the coil, which also generates a changing

magnetic field. If a second coil with a second associated electrical circuit is close enough to the first heating coil, some of the changing magnetic field will energize the windings of the second coil, which induces an alternating voltage (electromagnetic field) across the windings of the second coil. If a switching element (for example, the switch 81 of Figure 3) of the second circuit is open, this induced electromagnetic field cannot drive a heating current from one side of the coil around the circuit to the other side of the coil and through second coil. Therefore, when the switch is open, there is no heating of the coil. That is, although there is an induced electromagnetic field at the coil, there is no induction heating current flowing through the circuit to heat the coil. However, if the switching element is closed, an induced electromagnetic field may drive an alternating current from one side of the coil around the circuit to the other side of the coil and through the second coil, which causes heating.

Therefore, the circuit may be configured so that the switching element is able to prevent or permit current flow to the second heating coil. That is, the switching element may be located in the circuit path between one side of the coil and the other side of and the other side of the coil as shown in Figure 3.

In contrast, if the switching element were located at a point in the circuit pathway where current could bypass the switch and be driven from one side of the coil around the circuit to the other side of the coil, then the switching element could not prevent or permit induction of current.

The Action states that the claim language regarding mutual inductance that is either prevented or permitted does not substantively limit the scope of the claimed invention. *See* the Action, page 2. However, Claim 8 recites that each power supply circuit includes a switching element arranged to prevent or permit a mutual induction of current in a respective heating coil when an adjacent heating coil is energised according to a selected on or off status of the switching element. Thus, Claim 8 clearly recites two states in which the mutual induction of current is either permitted or prevented, respectively, according to an on or off status of the switching element. Applicants submit that the cited art does not teach or suggest at least this recitation of Claim 8 for the following reasons.

Uchida does not disclose the claimed switching element because Uchida proposes an induction heating unit having heating coils in which mutual induction is apparently always permitted regardless of the state of the switch. Uchida discusses that by equalizing currents to heating coils such that the faces are synchronized, the state of mutual induction is fixed, even when the load fluctuates. *See* Uchida, col. 5, lines 53-59. As such, by synchronizing the phases to adjacent heating coils, the unit is to be operated as desired with all coils performing a heating function using mutual induction.

In contrast to the switching element of the current claims, Uchida does not disclose a switching element arranged to prevent or permit mutual induction of current. The Action identifies the forward converting section 114 and the inverter 120 of Uchida as analogous to the claimed switching element. Although the inverter 120 may include switches (transistors), these switches would not function to prevent mutual induction as maintained in the Action. The inverter 120 is instead used for a completely different purpose, that is, inverting the DC current to AC current. Upon mutual induction of a coil (for example, coil 152m) by an adjacent coil (for example, coil 152s), a switching of the transistors in the inverter 120 would not be effective to permit or prevent a flow of current from one side of the coil 152m around the circuit via the capacitor 154m to the other side of the coil 152m since current would flow through the circuit shown in Uchida regardless of the state of the transistors in the inverter 120. As such, the forward converting section 114 and the inverter 120 cannot be considered analogous to the switching elements recited in Claim 8 because they do not function to prevent or permit mutual induction of current according to a selected on or off status of the switching element as recited in the current claims.

Moreover, the device of Uchida appears specifically designed to allow mutual inductance at any time because the circuit is set up such that mutual inductance achieves a useful effect. As such, there is no motivation or suggestion to modify the configuration of Uchida to include a switch that has a state in which actual induction does not occur.

The missing elements of Uchida are also not disclosed in Apple or Simcock, which are cited with respect to certain dependent claims.

For at least the reasons discussed above, Applicants submit that independent Claim 8 and Claims 9-14 depending therefrom are patentable over the cited art and request that the rejections under 35 U.S.C. §§ 102/103 be withdrawn.

II. New Claims 22-23

Claims 22-23 depend from Claim 8 and are patentable for at least the reasons discussed with respect to Claim 8 above. In addition, Claims 22-23 are separately patentable for the following reasons.

Claim 22 recites that the at least two induction heating coils comprise a first induction heating coil and a second induction heating coil. When the switching element is in the off status, the switching element is configured to open an induction coil circuit including the second induction heating coil to prevent the mutual induction of current by the second induction heating coil when the first induction heating coil is energised. When the switching element is in the on status, the switching element is configured to close the induction coil circuit including the second induction heating coil to permit the mutual induction of current in the second induction heating coil when the first induction heating coil is energised.

Claim 23 recites that each induction heating coil of the at least two induction heating coils comprises first and second opposite ends. The apparatus includes an induction coil circuit that includes a respective power supply circuit and electrically connects the first and second ends of the induction heating coil. The switching element is positioned in the induction coil circuit, and the switching element is configured to open the induction coil circuit when the switching element is in the off status to prevent the mutual induction of current and to close the induction coil circuit when the switching element is in the on status to permit the mutual induction of current.

The above recitations of Claims 22-23 are not disclosed by the cited art, which does not disclose an induction coil circuit having a switching element configured to open and close the induction coil circuit as recited in Claims 22-23.

For at least the above reasons, Applicants submit that Claims 22-23 are separately patentable and request an indication of same.

III. Examination of Withdrawn Claims 1-7 and 15-19 is Requested

Applicants request examination of Claims 1-7 and 15-19. In particular, the restriction requirement based on a lack of unity in view of GB No. 307044 to Krupfer (Krupfer) on page 2 of the Action is traversed for the following reasons. Krupfer does not teach or suggest a power supply circuit having a switch element arranged to prevent or permit a mutual induction of current as recited in Claims 1, 8 and 15. In fact, Krupfer is directed to an induction system in which two coils are magnetically separated by iron rings and a space or non-magnetic material to close the circuits from each other. *See* page 1, lines 60-69. Therefore Krupfer teaches away from allowing mutual induction of coils, and Claims 1, 8 and 15 do not lack unity of invention.

For at least the reasons discussed above, the rejoinder and examination of Claims 1-7 and 15-19 is respectfully requested.

CONCLUSION

Accordingly, Applicants submit that the present application is in condition for allowance and the same is earnestly solicited. Should the Examiner have any matters outstanding of resolution, he is encouraged to telephone the undersigned at 919-854-1400 for expeditious handling.

Respectfully submitted,



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